Amendments to the Drawings

The attached sheet of drawings include changes to Fig. 3. These sheets, which include Fig. 3, replace the original sheet including Fig. 3.

Attachment: Replacement Sheet.

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-19 are presently active; Claims 20-49 have been withdrawn by a Restriction Requirement, and Claims 1 and 5 have been presently amended.

In the outstanding Office Action, Figure 3 was objected to due to informalities in the flow steps depicted. The specification was objected due to for not providing antecedent basis for the subject matter of Claim 18. Claims 1-8, 11, and 13-19 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication 2003/0151372 to Tsuchiya et al. Claims 9 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuchiya et al in view of Jap. Pat. Appl. Pub. 08-031753 to Tashiro et al. Claims 11 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsuchiya et al in view of U.S. Pat. No. 5,441,596 to Nulty.

Regarding the objection to the specification, the specification has been amended to provide antecedent basis for the subject matter of Claim 18. Thus, it is respectfully submitted that the objection to the specification has been overcome.

Regarding the objection to the drawings, on the replacement sheet, the steps depicted in Figure 3 have been relabeled. Thus, it is respectfully submitted that the objection to the drawings has been overcome.

Applicants acknowledge with appreciation the courtesy of Examiner Arancibia to conduct an interview in this case on September 20, 2005. During the interview, the issues identified in the outstanding Office Action were discussed as substantially summarized herebelow. Specifically, the drawing and specification changes noted above were discussed. Further, during the interview, changes to the independent Claim 1 were discussed to clarify that the plasma is ignited by using a first signal at a first RF frequency from a first frequency source

coupled to a first electrode in the processing chamber, and the plasma is sustained using a second signal ***applied to the first electrode*** at a second RF frequency. As discussed during the interview, Tsuchiya et al apply different RF frequency signals (one from the plasma-generation power source 4 and another from the ion-incidence power source 50) to different electrodes of the plasma chamber 1. Figure 1 of Tsuchiya et al shows the plasma-generation power source 4 connected to the RF electrode 3 and shows the ion-incidence power source 50 connected to the substrate holder 5.

While such changes appear to differentiate from Tsuchiya et al, Examiner Arancibia requested that differences from U.S. Pat. No. 5,882,424 to Taylor et al be considered in the formal reply to the outstanding Office Action. Taylor et al was cited, but not applied, in the outstanding Office Action.

Taylor et al disclose (as shown in Figure 1 thereof) the use of two separate RF power supplies 24 and 26 connected through a switch 25 to a powered electrode 18. Moreover, Taylor et al disclose thereafter that:

> Referring to FIG. 1, initially, the high frequency RF source 24 would be connected to one or both of the electrodes 18, 20 and/or the antenna 22 ***until the plasma has been generated***. Thereafter, ***the high frequency source 24 would be disconnected***, and the low frequency RF source 26 would be connected to one or both of the electrodes 18, 20 and/or the antenna 22 to sustain the plasma during the cleaning operation.
>
> The high frequency source 24 could also be left on to provide a mixed frequency excitation of the plasma. It is believed that ***a mixed frequency excitation during cleaning operations*** may provide a better cleaning of some areas of the chamber. Examples are some of the peripheral chamber components exclusive of the electrodes 18, 20, such as the chamber walls, pumping manifolds and pumping channels. In addition, it is believed that some types of deposits would be etched more efficiently in the presence of a mixed frequency excitation. For example, the mixed frequency excitation may more efficiently etch thermally deposited films which tend to deposit globally within the vacuum chamber 12 (as compared to a plasma deposited film which tends to have a deposition pattern more confined to the area between the driven electrodes 18, 20). These advantages associated with the use of a mixed frequency excitation of the plasma during cleaning operation may result from an expansion of the plasma within the reactor chamber which brings it closer to the peripheral chamber components.

> The ***mixed frequency excitation*** can be accomplished in a number of ways. One or both of the electrodes 18, 20 and/or the antenna 22, could be driven simultaneously by the high frequency and low frequency RF power sources 24, 26. Alternately, one or both of the electrodes could be driven by one of the two sources 24, 26 and the antenna 22 could be driven by the other source. Or, one of the electrodes 18, 20 could be driven by one of the two sources 24, 26, while the other electrode is driven by the other source, as long as the chamber is grounded (as shown in the dashed lines of FIG. 1). Of course, these are just examples of the possible permutations for driving the electrodes 18, 20, and antenna 22. It is not intended the present invention be limited to just these scenarios. Additionally, a single power supply might be employed which is capable of generating multiple RF signals of differing frequency. The key point is that a ***mixed frequency excitation*** is produced by simultaneously coupling high and low frequency RF signals to the plasma, no matter what driving configuration is employed. It is also noted that to prevent reflected power from affecting the performance of the RF power sources 24, 26, it is preferred that appropriate tunable matching networks 28 be employed between the sources 24, 26, and the electrodes 18, 20 and antenna 22.[1] [emphasis added]

Thus, Taylor et al disclose a number of mixed frequency excitation embodiments ***used once the plasma is ignited***. However, Taylor et al only disclose a single frequency plasma initiation. Hence, Taylor et al do not disclose igniting a plasma by changing an applied RF signal from a first signal at a first RF frequency to a second signal at a second RF frequency, as presently defined in Claim 1.

Support for the clarifications to Claim 1 are found in Applicants' specification numbered paragraphs [0031], [0037], [0038], and [0045] and [0046], which disclose that:

> [0031] In addition, the first matching network can be tuned to an initial value, the first RF source can provide a first top RF (TRF) signal to the first electrode in the processing chamber. The first TRF signal can be characterized by a first TRF frequency (TRF1) and a first TRF power level.
>
> [0037] In an alternate embodiment of the present invention, the frequency source can be stepped from TRF1 to TRF2. For example, the frequency source can be stepped linearly from TRF1 to TRF2.
>
> [0038] In the illustrated embodiment shown in FIG.1, a monitoring system is shown, and the monitoring system can be used to determine if the plasma has been ignited. When a plasma is ignited, the RF frequency source is stepped back from TRF2 to TRF1.

[1] Taylor et al, col. 7, lines 6-56.

> FIG. 4 illustrates a table of exemplary processing conditions and plasma state in accordance with one embodiment of the invention. For example, the data shows that a frequency step from 68 MHz to 60 MHz caused a plasma to be ignited and sustained in nearly all of the tests. [emphasis added]

Accordingly, as discussed during the interview, the method of the present invention permits a user to employ the reduced element matching network (defined in the withdrawn claims) in order to reduce the number of components (and hence reliability and costs) needed.[2]

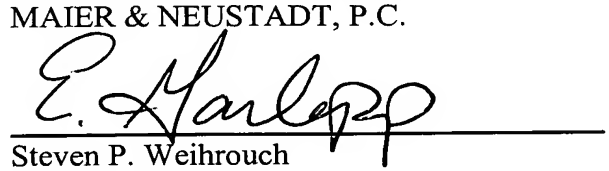
Given the use of single frequency plasma initiation in Taylor et al and given the use of separate electrodes in Tsuchiya et al, it is respectfully submitted that independent Claim 1 and the claims dependent therefrom patentably define over the cited references of record.

[2] Specification, numbered paragraph [0025].

Consequently, in view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Customer Number
22850

Steven P. Weihrouch
Attorney of Record
Registration No. 32,829

Edwin D. Garlepp
Registration No. 45,330

Attachments: Letter Submitting Replacement Drawing(s), Replacement Sheet (1)

I:\ATTY\RAR\AMENDMENTS\243294US\9-2005AM.DOC